BUILDING MANAGEMENT SYSTEM WITH NFC TAGS FOR MONITORING AND CONTROLLING BUILDING EQUIPMENT

BACKGROUND

[0001] The present invention relates generally to building management systems and more particularly to a building management system that uses near field communications (NFC) tags to facilitate monitoring and controlling building equipment.

[0002] A building management system (BMS) is, in general, a system of devices configured to control, monitor, and manage equipment in or around a building or building area. A BMS can include, for example, a HVAC system, a security system, a lighting system, a fire alerting system, any other system that is capable of managing building functions or devices, or any combination thereof.

[0003] Conventional BMSs use input from thermostats to measure the temperature of building spaces and to define temperature setpoints for the building spaces. The thermostats are typically mounted on walls within the building spaces. Each thermostat may include a temperature sensor and a user interface. The user interface typically includes an electronic display for presenting information to a user and one or more physical input devices (e.g., a rotary knob, pushbuttons, manually-operable switches, etc.) for receiving input from a user. The temperature sensor measures the temperature of the building space and provides the measured temperature to the user interface. To monitor the temperature of the building space, a user is required to move to the location of thermostat and view the measured temperature via the thermostat's user interface. To control the temperature of the building space, the user adjusts the temperature setpoint via the thermostat's user interface.

SUMMARY

[0004] One implementation of the present disclosure is a system for monitoring and controlling building equipment. The system includes a near field communications (NFC) tag located within a building space and storing a tag ID uniquely identifying the NFC tag. The system includes a temperature sensor associated with the building space and configured to measure a temperature of the building space. The temperature measured by the temperature sensor defines a zone temperature. The system includes a mobile device configured to communicate with the NFC tag. The mobile device reads the NFC tag and obtains the tag ID from the NFC tag via NFC. The system includes a controller in communication with the mobile device. The controller receives the tag ID from the mobile device and uses the tag ID to identify the temperature sensor associated with the building space. The controller receives the zone temperature from the temperature sensor and provides the zone temperature to the mobile device. The mobile device displays the zone temperature via a user interface of the mobile device.

[0005] In some embodiments, the system includes a control application running on the mobile device. The control application may display the zone temperature and may allow a user to adjust a setpoint for the zone temperature via the user interface of the mobile device. The mobile device may send the adjusted setpoint to the controller. The controller may use the adjusted setpoint to control building equipment associated with the building space. In some embodiments, the NFC tag stores a location of the control application and the mobile device obtains the location of the control location from the NFC tag via NFC. The mobile device may use the location of the control application to download and install the control application. The control application may configure the mobile device to communicate with the controller.

[0006] In some embodiments, the system includes a locations database storing an association between the tag ID and the building space in which the NFC tag is located. The controller may use the stored association between the tag ID and the building space to determine that the mobile device is located within the building space. In some embodiments, the locations database stores an association between the building space and the temperature sensor. The controller may use the stored association between the building space and the temperature sensor to identify the temperature sensor associated with the building space.

[0007] In some embodiments, the NFC tag includes an integrated temperature sensor configured to measure a temperature of the building space at a location of the NFC tag. The temperature measured by the integrated temperature sensor may define a tag temperature. In some embodiments, the NFC tag is a passive NFC tag that becomes energized by the mobile device when the mobile device reads the NFC tag. The integrated temperature sensor may measure the tag temperature in response to the NFC tag becoming energized by the mobile device. In some embodiments, the NFC tag provides the tag temperature to the mobile device via NFC when the mobile device reads the NFC tag. The mobile device may display the tag temperature via the user interface of the mobile device. In some embodiments, the mobile device sends the tag temperature to the controller and the controller uses the tag temperature to control building equipment associated with the building space.

[0008] In some embodiments, the NFC tag includes one or more integrated sensors including at least one of a temperature sensor, a humidity sensor, an oxygen sensor, a pressure sensor, and an accelerometer. The NFC tag may use the one or more integrated sensors to measure at least one or a temperature, a humidity, an oxygen level, a pressure, and an acceleration at a location of the NFC tag when the NFC tag is energized by the mobile device.

[0009] In some embodiments, the NFC tag is located within a wall of the building space and includes an integrated humidity sensor configured to measure a humidity within the wall when the NFC tag is energized by the mobile device. The NFC tag may provide the measured humidity to the mobile device via NFC when the mobile device reads the NFC tag.

[0010] Another implementation of the present disclosure is a system for monitoring and controlling building equipment. The system includes a controller for the building equipment, a near field communications (NFC) tag, and a mobile device. The NFC tag is located within a building space and stores a location of a control application. The mobile device is configured to communicate with the NFC tag. The mobile device reads the NFC tag and obtains the location of the control application from the NFC tag via NFC. The mobile device uses the location of the control application to download and install the control application. The control application configures the mobile device to communicate with the controller.

[0011] In some embodiments, the mobile device uses the control application to adjust a setpoint for the controller. The